# The Monthly Evening Sky Map

**A SCIENTIFIC JOURNAL AND EDUCATIONAL GUIDE IN ASTRONOMY FOR THE AMATEUR**

Founded in 1905 by Leon Barritt

**ALSO A STAR, CONSTELLATION AND PLANET FINDER MAP ARRANGED FOR THE CURRENT MONTHS - MORNING AND EVENING - AND PRACTICAL ANYWHERE IN THE WORLD**

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11
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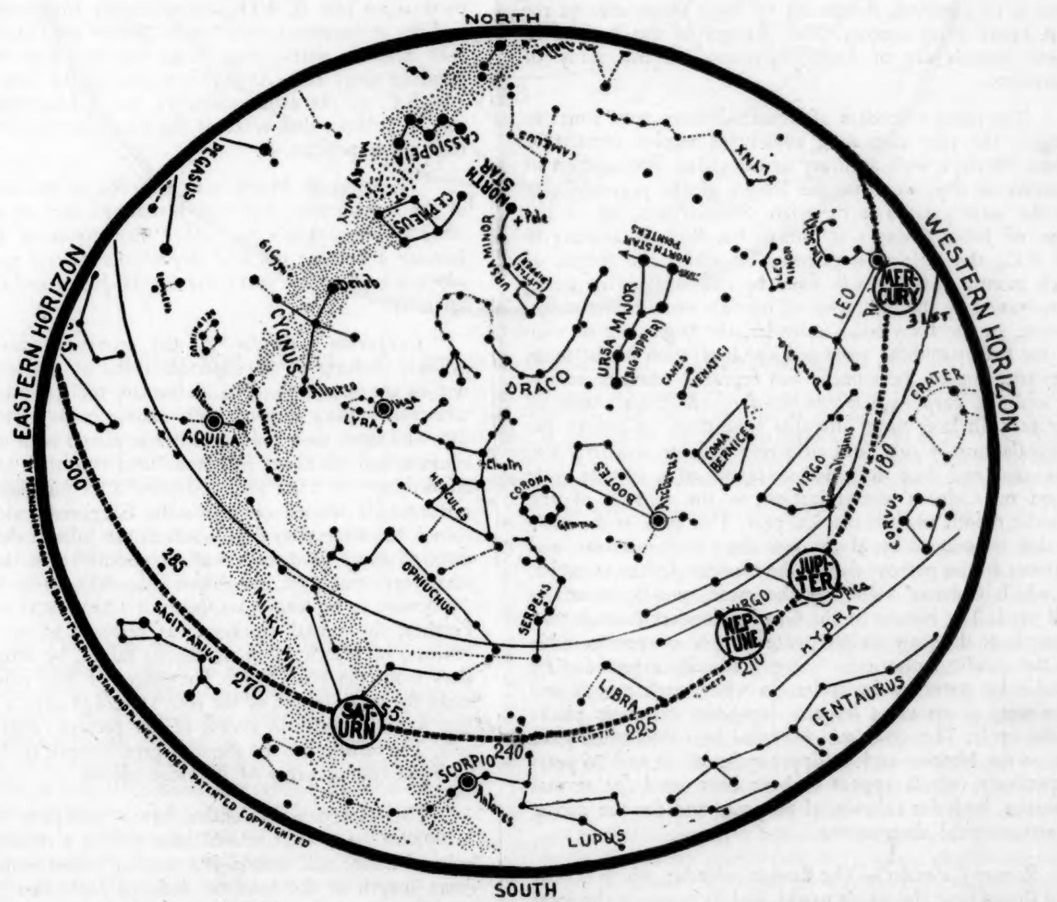
## EVENING SKY MAP FOR JULY




**AT 9:30 P.M., JULY 1     8:30 P.M., JULY 15     7:30 P.M., JULY 31**

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper.

This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitude in Europe.

# THE CALENDAR

A calendar is a method of combining days into periods adapted to the purposes of civil life and religious observances, or to the requirements of scientific precision. Three of the periods used in calendars, namely days, months and years, are based on those astronomical periods that have the greatest importance for the conditions of human life. Other measures of time, such as the week and the subdivisions of the day, are artificial.

The complexity of calendars is due mainly to the incommensurability of the astronomical periods on which they are based. The supply of light by the Sun and Moon is governed by the periods known as the solar day and the synodic month, while the return of the seasons depends on the tropical year. The length of the synodic month at the present time is 29·5305879 days, while that of the tropical year is 365·24219 days, each period being subject to an uncertainty of about one unit in the last figure given. Both periods are slowly decreasing, the synodic month or lunation by about three and a half units in the last figure every century, and the year by about one and a third units in the last figure every century. From the lengths of these two periods we find that the number of lunations in a tropical year is 12·3682668, decreasing by about three units in the last figure every century. The changes in the lengths of these periods are of little importance in the study of calendars.

The many calendars of historical times were lunar in origin, the year consisting usually of twelve months of about 30 days, with arbitrary or calculated intercalation of months or days to make the length of the year conform to the solar year. The Egyptian calendar was, up to the time of Julius Caesar's reform of the Roman calendar in 46 B.C., the only civil calendar in which the length of each month and year was fixed by rule, instead of being determined by the discretion of officials or by direct observation. In the Babylonian calendar, the beginning of each of the twelve months was fixed by observation of the lunar crescent; one of the months was repeated when necessary, *in order to keep each month fixed to a definite season of the year.* In later times attempts were made to govern the intercalations by rule, and an 8-year cycle or *octaeteris* was first used and then discarded in favour of a 19-year cycle based on Cidenas' determination of the lengths of the synodic month and the tropical year. This cycle is the same as that introduced by Meton into the Greek calendar, and survives to the present day in the modern Jewish calendar, in which Cidenas' value for the mean synodic month is still used. The history of the Greek calendars furnishes an example of the early arbitrary intercalation of months made by the public authorities, being gradually superseded by fixed rules governed by cycles, in which each month and year were given exact lengths dependent on their places in the cycle. The *octaeteris,* invented by Cleostratus, gave way to the Metonic and Callippic cycles of 19 and 76 years respectively, which appear to have been used for several centuries, both for calendarial purposes and for the dating of astronomical observations.

*Roman Calendar.*—The Roman calendar, which is now used throughout the whole world, had its origin in the local calendar of the city of Rome. It may be regarded as certain that the Roman months were originally lunar, and for a long period the normal length of the year remained at 335 days, an intercalary month being inserted at the discretion of the authorities to make the mean length of the year approximate to the solar year. Under the pontificate of Julius Caesar, intercalation was neglected with such frequency that in 47 B.C. the calendar was about two months out of step with the solar year. In 46 B.C. Caesar not only made the usual intercalation of 23 days, but inserted two months, amounting to 67 days, between November and December, so that the Kalends (1st day) of January of 45 B.C. fell on what is still called January 1 of the Julian calendar. From that time each of the twelve months has had its present duration, though the name of two of the months have been subsequently changed — Quintilis was changed to July in 44 B.C. in honour of Julius Caesar and Sextilis was renamed August in 8 B.C. in honour of Augustus Caesar.

The revised calendar, in framing which Caesar had the assistance of the astronomer Sosigenes of Alexandria, adopted a mean length of 365.25 days for the year, three years out of four being given 365 day and the fourth 366 days. Owing to a misunderstanding of the edict, an additional day was intercolated every three years until 8 B.C., when Augustus rectified the error by omitting all intercalations until A.D. 8, from which date the Julian calendar was observed strictly until its reform by Pope Gregory XIII in A.D. 1582. In passing from years B.C. to years A.D., there is no year 0, A.D. 1 immediately following 1 B.C., and so astronomers style years before the Christian era with negative dates, these being one less than the corresponding dates B.C. As the first year of the new calendar (45 B.C. or -44 astronomically) was a bissextile or leap year, it follows that years of the Christian era divisible by four are leap years.

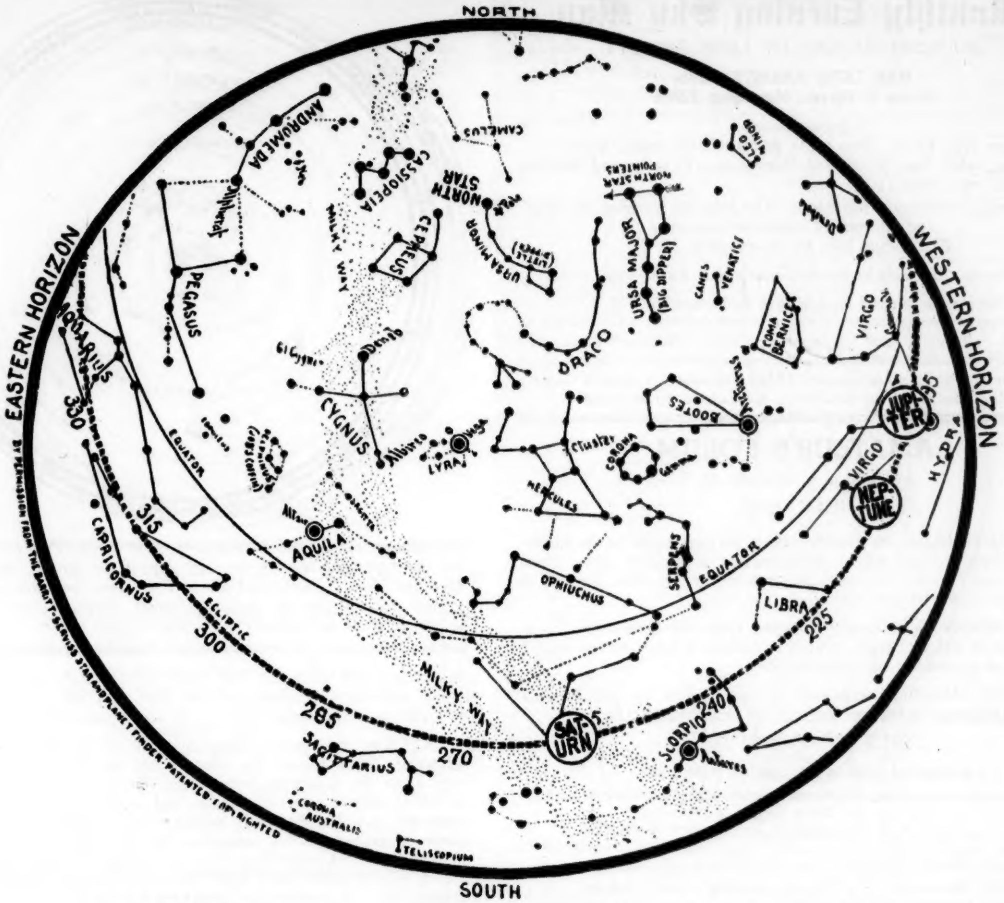
Traditionally March was regarded as the first month of the Roman year, but with a changed date of entry into office of the consuls and other magistrates in 153 B.C., January 1 became the first day of the official year, to be adopted later as new year's day for the Julian and Gregorian calendars.

*Gregorian Calendar.* As the centuries advanced the gradual shifting of the calendar dates of the seasons did not escape attention. The defect in the calendar in the sixteenth century showed itself mainly in its effect on the date of Easter, since the tables in use placed both the vernal equinox and the Easter full moon later than their true dates. Accordingly in 1582 Pope Gregory XIII published a bull instituting a revised calendar—the Gregorian calendar. In future, the intercalary day, which in the Julian calendar was inserted every four years was to be omitted in those centurial years that were not divisible by 400. Thus 1600 and 2000 were to be leap years, but not 1700, 1800 and 1900. Further, the vernal equinox was restored to its assigned position of March 21 in the Easter tables, by dropping 10 days from the year 1582. The effect of this rule was to make the mean length of the year 365·2425 days, a duration that is but slightly in excess of the present length of the year. The reform has the merit of great simplicity, combined with extreme accuracy of its mean values.

The Gregorian calendar has a complete cycle of 5,700,000 years, after which there will be a recurrence not only of Easter full moons, but also of Easter Sunday. The mean length of the lunation deduced from this period is 29·5305869 days, which is in error by only a millionth part of a day at the present time, but will be correct in the course of 300 years.

The Roman Catholic states adopted the revised calendar in 1582 or shortly afterwards, but the Protestant states and the oriental countries did not adopt it till many years later. In the British Dominions the change of calendar was

# EVENING SKY MAP FOR AUGUST




**AT 9:00 P.M., AUG. 1 8:00 P.M., AUG. 15 7:30 P.M., AUG: 31**

Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper. This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitudes in Europe.

effected by giving the name September 14 to the day after September 2 in 1752. It did not become the official calendar of Japan until 1873 or of Russia until 1918, while it was adopted by Rumania and Greece in 1924 and by Turkey in 1927.

*Easter.* The Christian church has continued the Jewish festival of Passover, which as a Christian festival has received the name of Easter. According to the Mosaic law the sacrifice of the Passover was observed on the 14th day of the spring month Nisan; in ancient times the Jewish calendar was purely lunar, so that the beginning of the month Nisan was determined observationally from the new moon nearest the vernal equinox. In the early centuries of the Christian era, although most of the Christian churches celebrated Easter on the Sunday following the 14th day of the Easter month, there was heated controversy as to which (lunar) month was Nisan, upon which day it was to begin and as to the limiting dates between which Easter could lie. Of the various cycles based on the mean values of the lengths of the tropical year and lunar month, the Roman cycle of 84 years and the Alexandrian of 19 years obtained wide currency. The General Council of Nice in A.D. 325 and the Synod of Whitby in A.D. 664 both favoured the Alexandrian 19-year cycle, which afterwards became generally current until the reform of the Julian calendar in 1582.

In this cycle, Easter day was the first Sunday after the 14th day of the Easter moon, and in the first year of the cycle this date was taken as April 5; simple rules governed the dates in subsequent years, until after 19 years the 14th day returned to April 5. The approximations made in the lengths of both the tropical year and the lunar month rapidly made this cycle give dates for Easter far removed from the vernal equinox, and it was mainly to correct this that Gregory instituted the revised calendar. The simplicity that marked the treatment of the gregorian calendar was also extended to the rules for determining Easter; the 19-year cycle was retained in principle, but all full moon dates were put back three days (or advanced seven days if the reduction to the Gregorian year is included), while simple rules were made to ensure that April 18 was the last possible date for the Easter full moon. In addition, a cycle of forward and backward shifts of one day in centurial years was introduced to bring the length of the lunation into accord with the adopted value. This has the great merit of simplicity of application, since for a period varying from one to three centuries, it is able to determine the date of the Easter full moon as if all calendar years were of equal duration, and

*—Continued on page 11*

The

# Monthly Evening Sky Map

FOUNDED IN 1905 BY LEON BARRITT

**MRS. LEON BARRITT, Editor**
**Irving L. Meyer, Managing Editor**

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## AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

JULY, 1958

THE SUN: begins the month close to its high point in the northern hemisphere, and moves at increasing southward speed from Gemini into Cancer. The earth is farthest from the Sun the 5th, at a distance of 94,400,000 miles.

THE MOON: is at *apogee* (farthest from the earth) the 8th at a distance of 251,000 miles, and is at *perigee* (closest to the earth) the 21st at a distance of 229,000 miles.

Libration: Maximum exposure of the regions on the Moon's limbs takes place as follows:

| | | |
|---|---|---|
| July 3 | West limb, | 5.3° |
| July 3 | South limb, | 6.6° |
| July 15 | East limb, | 5.4° |
| July 17 | North limb, | 6.5° |
| July 30 | West limb, | 5.1° |
| July 30 | South limb, | 6.6° |

The Moon's Phases (E.S.T.):

| | |
|---|---|
| Full Moon | July 1 at 1:04 am |
| Last Quarter | 8 at 7:21 pm |
| New Moon | 16 at 1:33 pm |
| First Quarter | 23 at 9:19 am |
| Full Moon | 30 at 11:47 am |

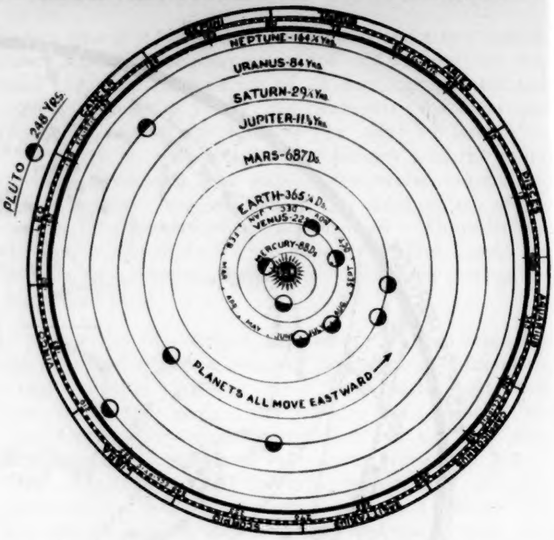
MERCURY: moves eastward all month, leaving Gemini, crossing Cancer, and moving well into Leo. It is an evening star all month, reaching greatest elongation (east of the Sun) of 27° 6' on the 26th. For about a week around the 26th the planet will be observable low in the west, shortly after sunset. It will shine at magnitude 0.6, and in the telescope (the Model K-4 is entirely adequate) its 8" diameter disc will appear about 40% illuminated, or crescent-shaped. On the 1st is is 115 million miles from the earth; on the 31st, 75 million miles.

VENUS: still holds sway in the morning sky. It moves from Taurus into Gemini, and is so situated on the ecliptic in relation to the Sun that observation from the Northern hemisphere is favored. Though still brilliant to the naked eye (magnitude -3.3), it is no longer a particularly interesting sight in the telescope. However, an observer who follows the planet in his telescope as the morning sky brightens, will have no trouble in noting the small, gibbous disc. Venus averages about 12" in diameter, and a little more than 80% illuminated. Distance the 1st is 120 million miles; the 31st, 136 million miles.

MARS: is at quadrature on the 27th, meaning that it is 90° from opposition. Accordingly, it rises at midnight, and is best placed for observation at dawn. Now north of the equator, it moves from Pisces into Aries, and, daily, becomes brighter and closer to the earth. During the month, magnitude increases from 0.3 to -0.1, diameter increases from 8½" to 10", and minimum illumination, 84%, is reached. In the telescope it will look almost exactly like Venus, though a shade smaller, but unlike Venus whose disc is devoid of markings, that of Mars will show a polar cap and other noticeable detail. Distance from the earth the 1st is 101 million miles, decreasing to 85 million miles the 31st.

JUPITER: remains an evening sky object the entire month, in Virgo. Though well past opposition, it is in good observing pbserving position in the early evening hours, setting around midnight.

**HELIOCENTRIC POSITIONS OF THE PLANETS, JULY**




The planets are shown in their respective orbits. Two positions, one for the first, and one for the last day of the month are given for Mercury, Venus, Earth, and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus, Neptune, and Pluto are shown in their mean position for the current month.

Binoculars will show the four brightest satellites, and a small telescope will show markings on the disc. On the 15th, distance is 495 million miles, magnitude is -1.6, and equatorial diameter is 37".

SATURN: the most striking material in the night sky for the telescope. Well placed for observation, in Ophiuchus, it is best seen from the southern hemisphere. The planet's wonderful ring system is opened to its maximum, and can be detected with modest telescopic aid. On the 15th, Saturn is 853 million miles from the earth. Magnitude is 0.4, ring diameter 41", the planet's equatorial diameter 18". One satellite, Titan, is about as bright as Neptune, and is easy to detect in a small telescope. Several others are fairly bright, too.

URANUS: is in Cancer, in the evening sky, the entire month. It is too close to the Sun to be observable. Distance from the earth the 15th is 1805 million miles.

NEPTUNE: is in Virgo, a few degrees south-east of Jupiter. In the evening sky all month, it is, however, beyond the reach of the naked eye. A small telescope will show up this 8th magnitude, remote giant. A power of 100 diameters or more will show a tiny, dull disc. Distance the 15th is 2800 million miles.

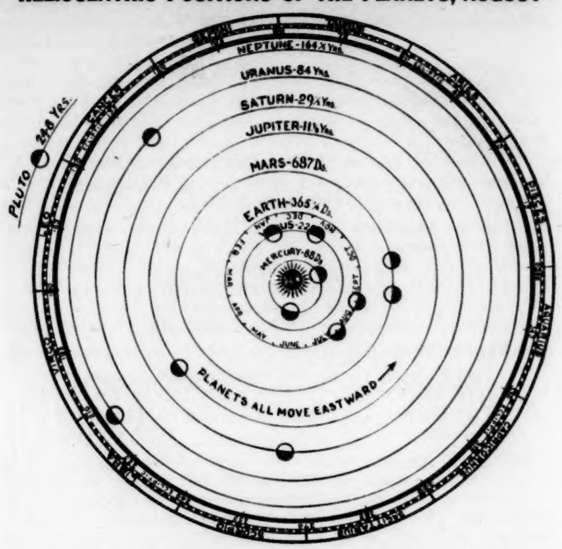
## ASTRONOMICAL CALENDAR

Eastern Standard Time

JULY, 1958

| | |
|---|---|
| July 1— 1:54 am | Minimum of Algol |
| 3—10:43 pm | Minimum of Algol |
| 5— 3:— pm | Earth in Aphelion |
| 6— 7:31 pm | Minimum of Algol |
| 9—10:00 am | Conjunction, Mars and Moon; Mars south 2° 58' |
| 9— 2:— pm | Mars in perihelion |
| 9— 4:20 pm | Minimum of Algol |
| 10—10:— pm | Conjunction, Mercury and Uranus; Mercury north 0° 44' |
| 12— 1:09 pm | Minimum of Algol |
| 14— 1:21 am | Conjunction, Venus and Moon; Venus north 2° 49' |
| 14— 6:— pm | Neptune stationary in Right Ascension |
| 15— 9:57 am | Minimum of Algol |
| 15— 3:— pm | Quadrature, Jupiter and Sun |
| 17— 9:55 pm | Conjunction, Uranus and Moon; Uranus north 5° 40' |
| 18— 6:46 am | Minimum of Algol |
| 18— 3:55 pm | Conjunction, Mercury and Moon; Mercury north 5° 5' |
| 20— 1:— pm | Mercury in descending node |
| 21— 3:34 am | Minimum of Algol |

## HELIOCENTRIC POSITIONS OF THE PLANETS, AUGUST




| | |
|---|---|
| 22—10:43 pm | Conjunction, Jupiter and Moon; Jupiter north 1° 31' |
| 23— 1:11 pm | Conjunction, Neptune and Moon; Neptune north 1° 19' |
| 24—12:23 am | Minimum of Algol |
| 25— 7:— am | Quadrature, Neptune and Sun |
| 26— 4:— pm | Mercury greatest elongation east of the Sun, 27° 6' |
| 26— 9:12 pm | Minimum of Algol |
| 26—10:23 pm | Conjunction, Saturn and Moon; Saturn south 2° 43' |
| 27— 2:— am | Quadrature, Mars and Sun |
| 29— 6:— pm | Minimum of Algol |
| 29—— — pm | Delta Aquarid Meteor Shower |
| 30— 8:— pm | Mercury in Aphelion |

## AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

AUGUST, 1958

THE SUN: is moving at a more rapid pace toward the southern hemisphere, with noticeable shortening of the days in the northern hemisphere. It travels from Cancer into Leo. Distance the 1st is 94.3 million miles, decreasing slightly to 93.8 million miles the 31st.

THE MOON: is farthest from the earth the 5th at 251,000 miles, and is closest the 17th at 226,000 miles.

Libration: Maximum exposure of the regions on the Moon's limbs takes place as follows:

August 12 East limb, 6.2°
August 13 North limb, 6.6°
August 25 West limb, 5.8°
August 26 South limb, 6.7°

The Moon's Phases (E.S.T.):

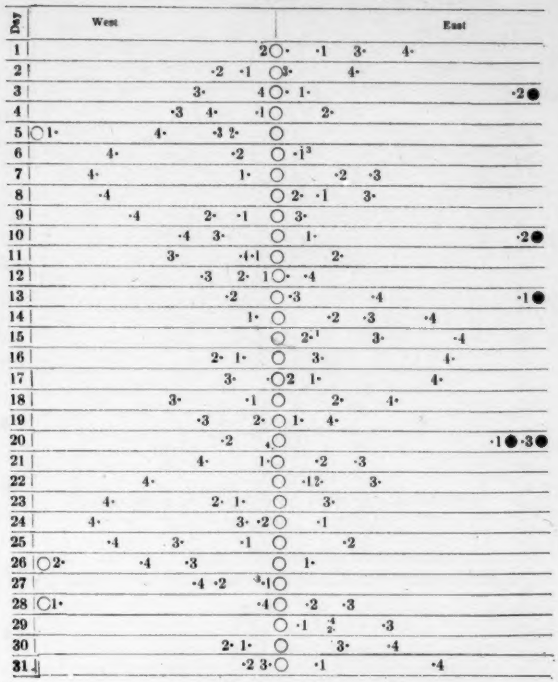
| | |
|---|---|
| Last Quarter | August 7 at 12:49 pm |
| New Moon | 14 at 10:33 pm |
| First Quarter | 21 at 2:45 pm |
| Full Moon | 29 at 12:53 am |

MERCURY: retrogrades most of the month, making a small loop in the neighborhood of Regulus, in Leo. It will still be visible in the evening sky for the first few days of the month, close to the western horizon as the twilight deepens. It is not particularly bright — about equal to Regulus — and will present a distinctly crescent shape in the telescope. It is in inferior conjunction with the Sun on the 23rd, thereupon entering the morning sky. By the end of the month it can be seen low in the east just before sunrise It is closest to the earth the 20th at 57 million miles.

VENUS: moves from Gemini, through Cancer, to the Leo boundary. It will be only a few degrees north-west of Mercury at the end of the month. Venus remains brilliant, but is too close to the Sun for convenient observation. Its distance increases from 137 million miles the first, to 148 million miles the 31st.

### SATELLITES OF JUPITER

JULY




**Appearance of Jupiter and its satellites at 10:00 P.M., E.S.T. as seen in an inverting telescope**

MARS: now rises before midnight. It is becoming better placed for observation every day, particularly for the northern hemisphere. It moves through Aries during the month, to the Taurus boundary. It is approaching the earth rapidly — distance decreases from 85 million miles the 1st, to 70 million miles the 31st — with increases in brightness from magnitude -0.1 to -0.5, and in apparent diameter from 10.2" to 12.5". It is now close enough that 4 and 6 inch telescopes will reveal prominent markings like the polar cap (the southern one tilted toward both the earth and the Sun) and the Syrtis Major (a dark green, funnel-shaped surface feature). To the naked eye, it is one of the brightest star-like objects.

JUPITER: now setting well before midnight, its evening sky career is soon to end this year. South of the equator, in Virgo, on the 15th distance is 538 million miles and magnitude is -1.4.

SATURN: is in Ophiuchus, not too far northeast of Antares. Well placed for observation in the evening sky, It sets shortly after midnight. The unique ring system are seen at their best; keen-eyed telescope users should look for Cassini's Division in the rings, as well as the shadow of the globe of the planet on the rings. On the globe itself, cloud bands are not difficult to detect. On the 15th, distance is 887 million miles, magnitude is 0.6, and the rings have an apparent diameter of 39".

URANUS: in Cancer all month, is in conjunction with the Sun the 4th, and thereupon enters the morning sky. Too close to the Sun all month to be observable. It is farthest from the earth this year on the 4th at 1809 million miles.

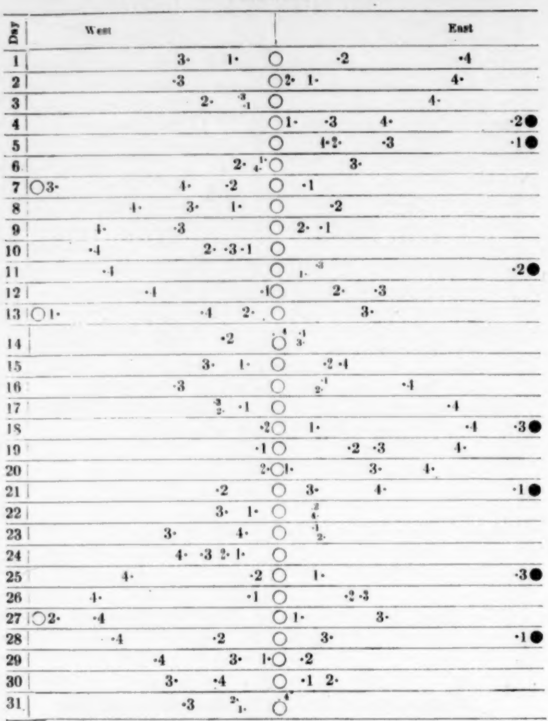
NEPTUNE: near Jupiter, in Virgo, is still observable in the evening sky, but the combination of its faintness (magnitude 8) and early setting render it both difficult and uninteresting. Distance the 15th is 2887 million miles.

## COMET BURNHAM

Comet Burnham followed its predicted path in Gemini, as reported in the last issue of the "Map". It was seen pretty easily with the 4-inch K-4 reflector, but was beyond the grasp of binoculars. It was diffuse, and easily identified by its rapid motion among the stars.

## SATELLITES OF JUPITER

AUGUST




**Appearance of Jupiter and its satellites at 8:45 P.M., E.S.T. as seen in an inverting telescope**

## ASTRONOMICAL CALENDAR

Eastern Standard Time

AUGUST, 1958

| | | |
|---|---|---|
| August | 1— 2:49 pm | Minimum of Algol |
| | 4—11:37 am | Minimum of Algol |
| | 4— 5:— pm | Conjunction, Uranus and Sun |
| | 7— 4:45 am | Conjunction, Mars and Moon; Mars south 1° 5' |
| | 7— 8:26 am | Minimum of Algol |
| | 8— 6:— pm | Mercury stationary in Right Ascension |
| | 9— 3:— am | Venus in ascending node |
| | 10— 5:14 am | Minimum of Algol |
| | 12— — am | Perseid Meteor Shower |
| | 13— 2:03 am | Minimum of Algol |
| | 13— 6:02 am | Conjunction, Venus and Moon; Venus north 5° 20' |
| | 14— 9:47 am | Conjunction, Uranus and Moon; Uranus north 5° 37' |
| | 15— 9:16 pm | Conjunction, Mercury and Moon; Mercury south 0° 55' |
| | 15—10:52 pm | Minimum of Algol |
| | 18— 7:40 pm | Minimum of Algol |
| | 19—10:06 am | Conjunction, Jupiter and Moon; Jupiter north 0° 51' |
| | 19— 7:22 pm | Conjunction, Neptune and Moon; Neptune north 1° 1' |
| | 20— 4:— am | Mercury greatest heliocentric latitude south |
| | 21— 4:29 pm | Minimum of Algol |
| | 23— 2:47 am | Conjunction, Saturn and Moon; Saturn south 2° 58' |
| | 23—10:— am | Inferior conjunction, Mercury and Sun; Mercury south 4° 20' |
| | 24—12:— am | Saturn stationary in Right Ascension |
| | 24— 1:17 pm | Minimum of Algol |
| | 25— 1:— pm | Conjunction, Pluto and Sun |
| | 26— 6:— pm | Conjunction, Venus and Uranus; Venus south 0° 7' |
| | 27—10:06 am | Minimum of Algol |
| | 30— 6:54 am | Minimum of Algol |

## AMATEUR'S FORUM

BY IRVING L. MEYER, M. S.

SEPTEMBER, 1958

THE SUN: moves from Leo into Virgo, crossing the equator into the southern hemisphere on the 23rd. The earth's distance from the Sun decreases from 93.7 to 93.0 million miles during the month.

THE MOON: is at apogee twice during the month, on the 2nd and the 29th, each time at a distance of 252,000 miles. It is at perigee the 14th at 223,000 miles distance.

Libration: Maximum exposure of the regions on the Moon's limbs takes place as follows:

| | | |
|---|---|---|
| September 9 | East limb, | 7.0° |
| September 10 | North limb, | 6.7° |
| September 21 | West limb, | 7.0° |
| September 22 | South limb, | 6.8° |

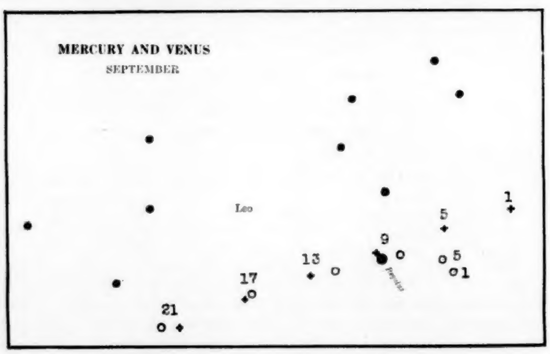
The Moon's Phases (E.S.T.):

| | | |
|---|---|---|
| Last Quarter | September 6 at | 5:24 am |
| New Moon | 13 at | 7:02 am |
| First Quarter | 19 at | 10:17 pm |
| Full Moon | 27 at | 4:43 pm |

MERCURY: moves through Leo most of the month, reaching a point on the equator in Virgo on the last day. In the morning sky all month, it is at greatest elongation west of the Sun, 17° 59', on the 9th. This month will be an ideal opportunity to identify Mercury, as it will be in conjunction with Venus twice. On the mornings of the 4th and 5th Mercury will be slightly over 2° (four diameters of the Moon) south of Venus, and though much fainter than Venus it will still be about magnitude 0.5. The second conjunction occurs on the morning of the 18th and Mercury will have brightened to magnitude -0.9. Mercury will be 1/3° (less than the diameter of the Moon) north of Venus. The two planets actually get closer together daily between the time of the first and second conjunctions, and at the time of Mercury's greatest elongation both are very close to Regulus. It is unfortunate that this pair cannot be observed in a completely dark sky; as a matter of fact, the sky will be bright by the time they clear the horizon. Mercury is 67 million miles away the 1st, as against 127 million miles the 30th. The rapid motion of Mercury will change its telescopic appearance from a thin crescent the 1st, to a nearly round disc by the time of the second conjunction.

VENUS: little more can be said here than was discussed under Mercury, preceding. Distance increases from 149 million miles the 1st to 156 million miles the 30th. Magnitude increases slightly, from -3.3 to -3.4.

MARS: high in Taurus, a few degrees south of the Pleiades, is well placed for observation in the late night sky. A reddish, brilliant star to the naked eye, its distance decreases from 69 million miles the 1st, to 55 million miles the 30th, with corresponding increases in magnitude (-0.5 to -1.1) and apparent diameter (12.6" to 15.7"). It averages about 90% illuminated, giving a noticeably gibbous appearance in the telescope. It is just past summer for the southern hemisphere of Mars, making the south polar cap visible to both the Sun and the earth.




The paths of Mercury and Venus in Leo in September. Positions of Mercury are indicated by a circle, those of Venus by a cross. Positions are for the mornings of the dates indicated. Note that the two planets are far apart the 1st, approach each other the 5th, and are close together from the 9th through the 21st. Unfortunately, the Sun is also close.

JUPITER: is in Virgo in the evening sky the entire month. It sets only a couple hours after the Sun, however, so is not well placed for observation. It is in conjunction with Neptune on the 26th. Distance the 15th is 573 million miles.

SATURN: sets around midnight from its location in Ophiuchus. It is still very interesting in the telescope, but the observation period is limited, and should be commenced at dusk. Even good binoculars will give indication of the ring system, though a telescope is needed to resolve it properly. On the 15th, distance from the earth is 933 million miles.

URANUS: is in Cancer, but very close to the western edge of Leo. It is a morning star, but since it is faint and, at best, barely visible to the naked eye, it is not well placed for observation. Opposition is still quite a way off, so its position will improve in the coming months. Distance the 15th is 1788 million miles.

NEPTUNE: is in Virgo, in the evening sky. It is a telescopic object only, and since it sets shortly after the Sun, it is poorly placed for observation. Distance the 15th is 2887 million miles.

## ASTRONOMICAL CALENDAR

Eastern Standard Time

SEPTEMBER, 1958

| | |
|---|---|
| Sept. 1— 8:— am | Mercury stationary in Right Ascension |
| 2— 3:43 am | Minimum of Algol |
| 4— 3:56 pm | Conjunction, Mars and Moon; Mars south 0° 31' |
| 4— 9:— pm | Conjunction, Mercury and Venus; Mercury south 2° 5' |
| 5—12:32 am | Minimum of Algol |
| 7— 9:20 pm | Minimum of Algol |
| 8— 5:— am | Mercury in ascending node |
| 9— 4:— am | Mercury greatest elongation west, 17° 59' |
| 10— 6:09 pm | Minimum of Algol |
| 10—10:48 pm | Conjunction, Uranus and Moon; Uranus north 5° 40' |
| 11— 4:— pm | Venus in perihelion |
| 12— 4:03 am | Conjunction, Mercury and Moon; Mercury north 5° 10' |
| 12— 7:36 am | Conjunction, Venus and Moon; Venus north 5° 24' |
| 12 Noon | Quadrature, Saturn and Sun |
| 12— 8:— pm | Mercury in perihelion |
| 13— 2:57 pm | Minimum of Algol |
| 16— 1:37 am | Conjunction, Jupiter and Moon; Jupiter north 0° 11' |
| 16— 4:11 am | Conjunction, Neptune and Moon; Neptune north 0° 47' |
| 16—11:46 am | Minimum of Algol |
| 18— 1:— am | Conjunction, Mercury and Venus; Mercury north 0° 21' |
| 19— 8:34 am | Minimum of Algol |
| 19— 9:33 am | Conjunction, Saturn and Moon; Saturn south 3° 15' |
| 22— 5:23 am | Minimum of Algol |
| 23— 2:— am | Mercury greatest heliocentric latitude north |
| 23— 8:10 am | Sun enters *sign* of Libra; equinox |
| 25— 2:12 am | Minimum of Algol |
| 26— 1:— am | Conjunction, Jupiter and Neptune; Jupiter south 0° 46' |
| 27—11:— pm | Minimum of Algol |
| 30— 7:49 pm | Minimum of Algol |

## QUESTIONS AND ANSWERS

REV. DUMONT CLARKE, NEW YORK, N. Y. ASKS:

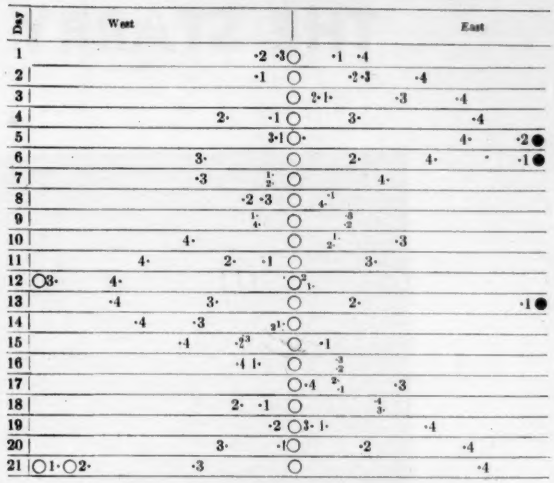
*"May I ask for this information*

1. Are the planets, Venus, Mars, Jupiter, et al, suns shining with their own light or do they shine with reflected light from the Sun?

2. Does the earth shine in the same way that the other planets in the solar system shine?

*Answer:* None of the planets are known to be self-luminous. All shine, including the earth, with the reflected light of the Sun. Proof of this is found in the phases of Mercury, Venus, the Moon, and Mars. If any of these were shining with their own light, they would present a round appearance at all times.

SATELLITES OF JUPITER
SEPTEMBER



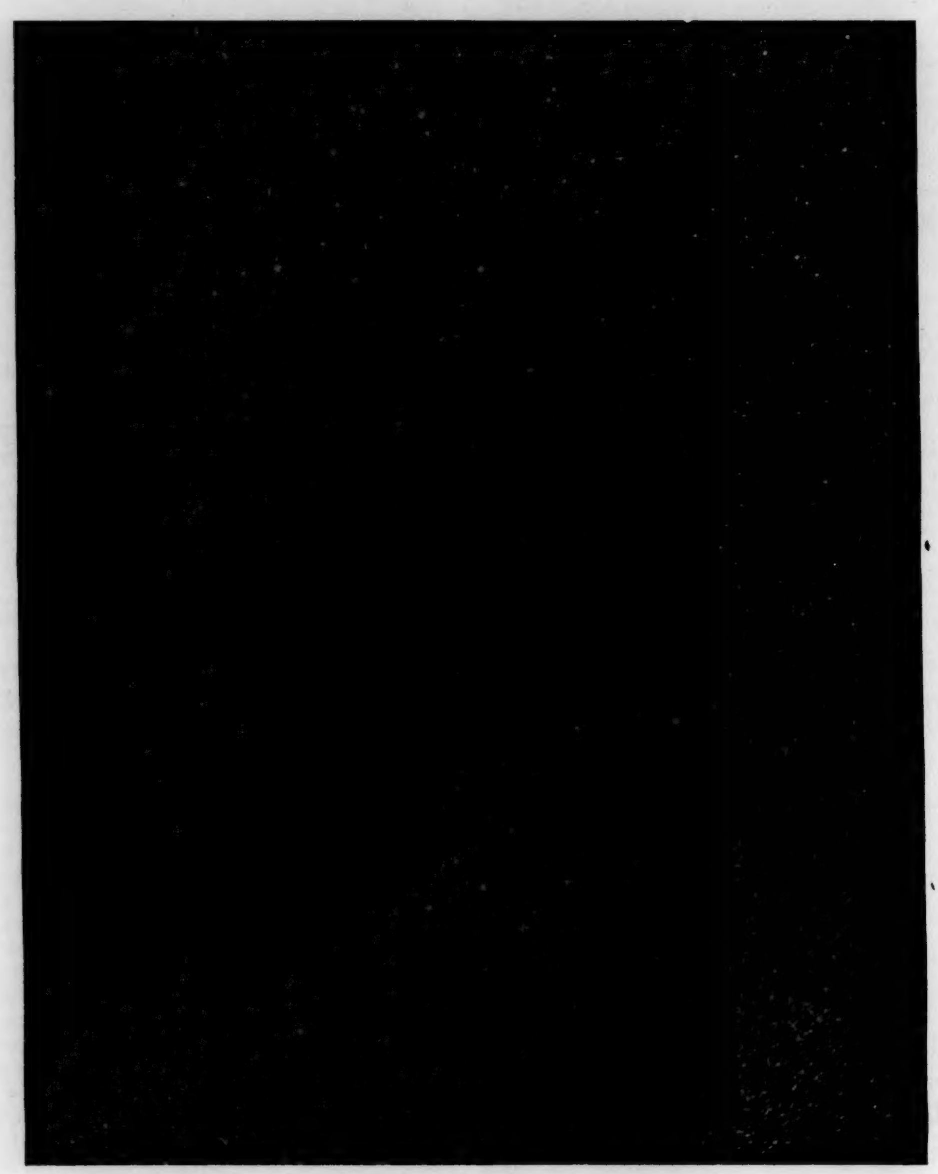

**Appearance of Jupiter and its satellites at 7:15 P.M., E.S.T. as seen in an inverting telescope**

Jupiter is represented by the disc in the center of the chart and each satellite by a dot and its appropriate number. The direction of the satellite's motion is from the dot toward the numeral. The numeral and light disc at the left margin of the chart indicates a satellite in transit across Jupiter's disc; the numeral and dark disc at the right margin indicates a satellite which is invisible because it is being eclipsed or occulted by Jupiter. This chart must be held upside down if binoculars, opera glasses, or an erecting type telescope is used.

## WHY MERCURY'S ELONGATIONS ARE BEST OBSERVED FROM THE SOUTHERN HEMISPHERE

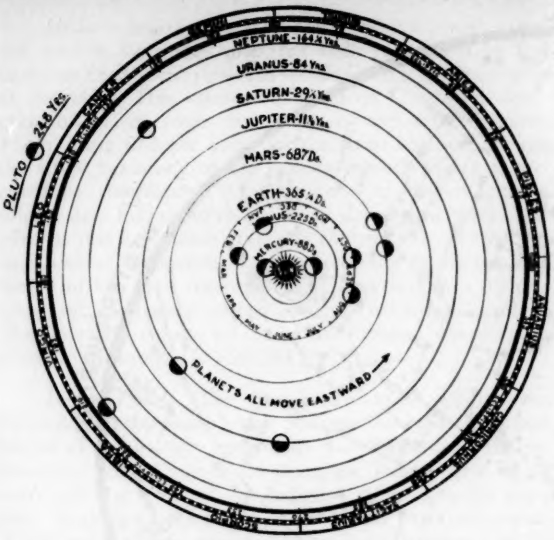
With the exception of Pluto of the major planets, the orbit of Mercury departs most from a circle. Its excentricity is somewhat greater than 20%, resulting in a perihelion distance of 28,560,000 miles from the Sun, and an aphelion distance of 43,360,000 miles from the Sun. It follows, naturally, that if Mercury is at greatest elongation from the Sun (as seen from the earth) when in aphelion, the angular separation between Mercury and the Sun will be at its maximum. This greatest angular separation amounts to almost 28°, some 10° greater than an elongation when the planet is in perihelion. At the moment of greatest elongation, the Sun, earth, and Mercury are at the points of a plane right triangle, with Mercury at the right angle. Knowing the distance of Mercury from the Sun, and the earth from the Sun, this triangle is solved easily by trigonometry, and yields the information that with Mercury in aphelion in heliocentric longitude 257°, the earth must be in heliocentric longitude 195° for a morning elongation, or 319° for an evening elongation. Annually, the earth arrives at these points on April 6th and August 13th, respectively. Unfortunately for northern observers, Mercury must be far south of the Sun on these dates, since in the morning sky Mercury is following the Sun up the ecliptic, and in the evening sky is preceding the Sun down the ecliptic. For southern hemisphere observers, conditions couldn't be better, and Mercury can actually be seen in a completely dark sky, something never possible in the northern hemisphere. This at least partly explains why such great astronomers as Kepler and Copernicus are reputed never to have seen Mercury.

# THE STARRY SUMMER SKIES



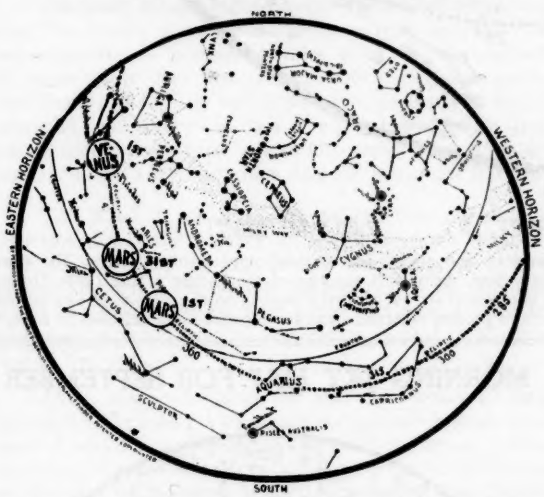
No more beautiful sight exists than the calm, star-filled night skies in the summer. If we choose one of those perfectly clear, moonless nights, some of the celestial wonders are revealed to the naked eye. With 7 x 50 binoculars, we suggest starting far south in Scorpio, and sweeping upward along the Milky Way through Sagittarius, Scutum, Aquila, Cygnus, Cepheus, to the Cassiopeia-Perseus region. Numberless star clouds will stand out, some revealed as faint misty patches of light, some partly resolveable into individual stars. Finally we wind up in Perseus at the wonderful naked-eye Double Cluster. And, if you are fortunate enough to have access to a telescope, the misty patches revealed by the binoculars are in turn resolved into multi-hued stars.

## HELIOCENTRIC POSITIONS OF THE PLANETS, SEPTEMBER




The planets are shown in their respective orbits. The positions, one for the first, and one for the last day of the month are given for Mercury, Venus, Earth and Mars. The arrow indicates the last day of the month. Jupiter, Saturn, Uranus, Neptune and Pluto are shown in their mean position for the current month.

## MORNING SKY MAP FOR JULY




At 4:00 A.M., July 1; 3:00 A.M., July 15; 2:00 A.M., July 31

Your address label now indicates the month and year of expiration of your subscription, rather than the issue number, as previously used. If your label reads "9-58" your expiration is September, 1958, or this issue.

## PLANET TABLES, 1958 - 1966

For use with The Barritt-Serviss Star & Planet Finder

This, the 13th edition of these Tables, covers a nine year period, giving all information necessary to enter the positions of the planets on the Star & Planet Finder. ALSO included are instructions for two new, tackless methods of attaching the planet discs.

Mail your remittance now—the Tables will go into the mail as soon as they come off the press.

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## A MERCATOR PROJECTION OF THE STAR FIELD FOR 50° NORTH AND 50° SOUTH OF THE EQUATOR

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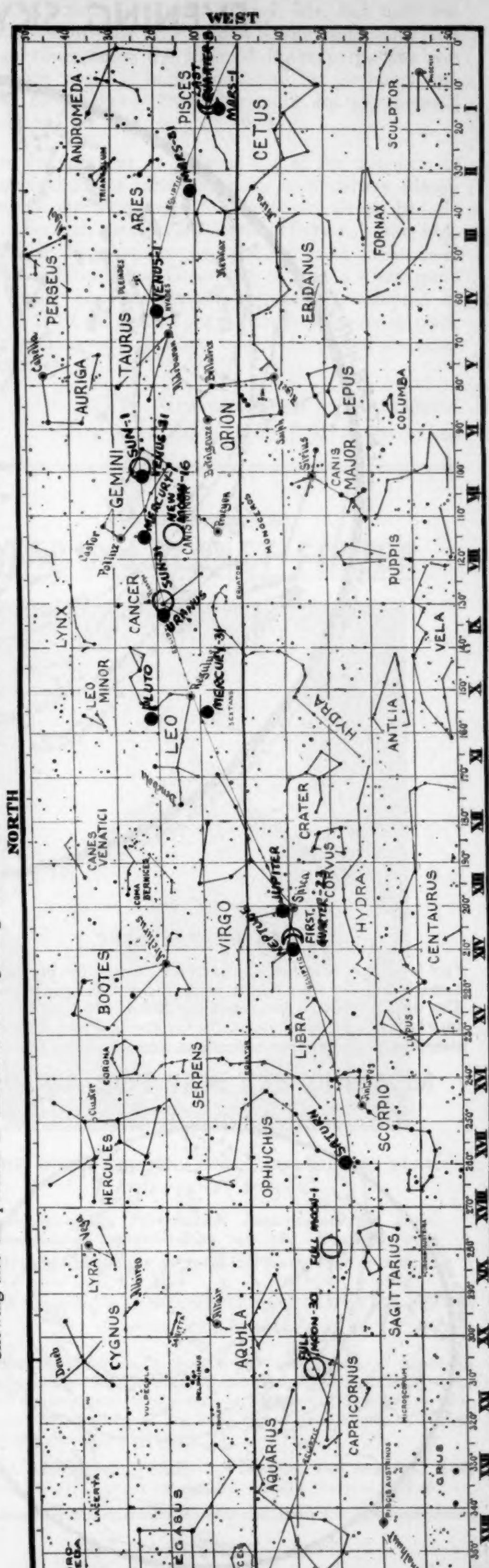
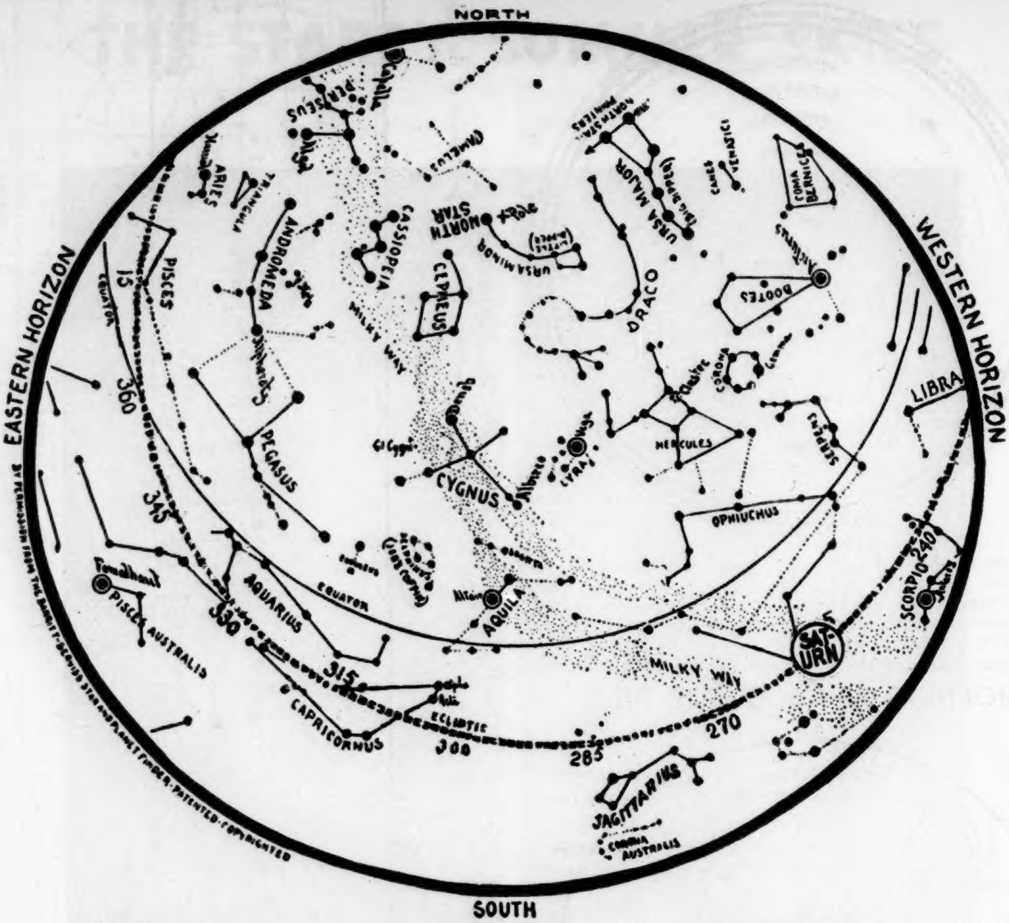
Showing also the position of the Sun at the beginning and ending of the month and the position of the Moon at its several phases.



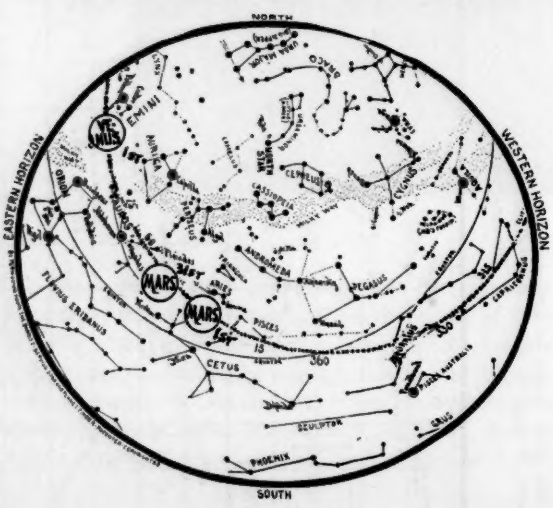
# EVENING SKY MAP FOR SEPTEMBER




**AT 9:00 P.M., SEPT. 1 — 8:00 P.M., SEPT. 15 — 7:00 P.M., SEPT: 30**

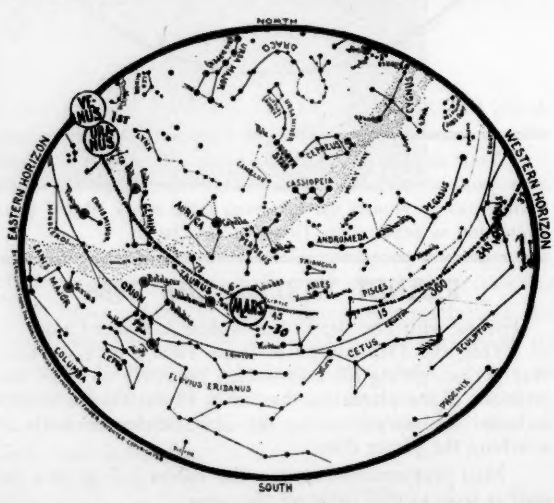
Face South and hold the Map overhead, the top North, and you will see the stars and planets just as they appear in the heavens. The arrow through the two stars in the bowl of the Big Dipper points to the North Star, the star at the end of the handle of the Little Dipper. This map is arranged specifically for Latitude 40 North—New York—but is practical for ten or fifteen degrees north or south of this latitude anywhere in the United States, the southern portion of Canada and the northern portion of Mexico and for corresponding latitudes in Europe.

## MORNING SKY MAP FOR AUGUST




At 4:00 A.M., Aug. 1; 3:00 A.M., Aug. 15; 2:00 A.M.; Aug. 31

## MORNING SKY MAP FOR SEPTEMBER




At 4:30 A.M., Sept. 1; 3:30 A.M., Sept. 15; 2:30 A.M., Sept. 30

*Continued from page 3*
as if the simple 19-year cycle were exactly applicable.

*Modern Jewish Calendar.* The empirical Jewish calendar used in historical times has been superseded by one based on fixed rules, in which nothing is left to observation or discretion. This calendar is based on a rigorous determination of the mean new moon of the autumn month Tishri, using Cidenas' value for the mean lunation, though the actual beginning of the calendar month Tishri is governed by complicated rules designed to prevent certain solemn days failing on inconvenient days of the week. The effect is that a common year may contain 353, 354 or 355 days, two of the months varying according to the requisite length of the year. Intercalation is governed by a 19-year cycle, the intercalary month alwarys containing 30 days. The Jews now employ an era of the creation, whose epoch is taken as October 7, 3761 B.C.

*Julian Period.* The French Protestant scholar and chronologist Josephus Justus Scaliger invented the Julian Period as a practically continuous measure of time. It combines the Solar Cycle of 28 years, the Lunar Cycle of 19 years and the Cycle of the Indiction comprising 15 years, thus containging 28 x 19 x 15 = 7980 years altogether. All these cycles are supposed to begin on January 1 of the Julian calendar, and it is found that they began together in 4713 B.C., so that one Julian Period includes all dates both in the past and in the future to which reference is likely to be made, and to that extent has an advantage over an era whose epoch lies within the limits of historical time.

The years of the Julian period are seldom employed now, but the day of the Julian period is frequently used in astronomy and in calendarial tables. It is the only method of enumerating days that is free from their combination into months and years, and is therefore particularly useful where an exact interval in days is required. The Julian days are numbered consecutively from Greenwich mean noon on January 1, 4713 B.C., at which date the Julian day was 0·0.

*The Week.* It is not possible to state how old or how widespread was the practice of abstaining from work on each seventh day, but the Mosaic law enjoined such a general abstinence, the seventh day being called the Sabbath. From the Jewish church this period has passed into the Christian, in which special verneration is paid to the first day of the week.

Quite independently of the Jews there arose not long before the Christian era an astrological period of seven days, each of which was identified with one of the seven planets, including the Sun and Moon. This gave rise to the names of the days of the week in the order Saturn, Sun, Moon, Mars, Mercury, Jupiter, Venus, which rapidly acquired a world wide popularity. In the Teutonic languages the names Tiu, Woden, Thor and Freya of the Teutonic divinities have taken the places of their Roman counterparts, Mars, Mercury, Jupiter and Venus.

*Subdivisions of the day.* From a remote antiquity the Egyptians divided each day and each night into twelve equal hours, which necessarily varied in length with the season of the year. These temporal hours spread through the civilised world and were used for the ordinary purposes of life until the invention of mechanical clocks in the fourteenth century. In the meantime the day had been divided into 24 equal hours for astronomical purposes; this divison appears to have been introduced by Hipparchus, while Ptolemy used it in his *Manual Tables,* and further subdivided the hour sexagesimally into minutes and seconds. After the invention of clocks the astronomical system of 24 equal (equinoctial) hours was used in civil life, but until the nineteenth century the time used was local solar time and not mean time. From the time of Ptolemy the day was considered to begin at mean noon, and the 24 hours continued to be numbered from this point for astronomical purposes until the beginning of 1925.

The development of railways led to the adoption of a single meridian for each country or each railway administration, Greenwich time being used in Great Britain, where it became statutory in 1880. Afterwards the time referred to local meridians gave place in most countries to zone time, differing from Greenwich time by a whole number of hours (or occasionally half-hours), adopted in Sweden in 1879, on most of the American railways in 1883, and in most European countries before the end of the nineteenth century.

—THE BRITISH NAUTICAL ALMANAC
*Based on an article by Dr. J. K. Fotheringham*

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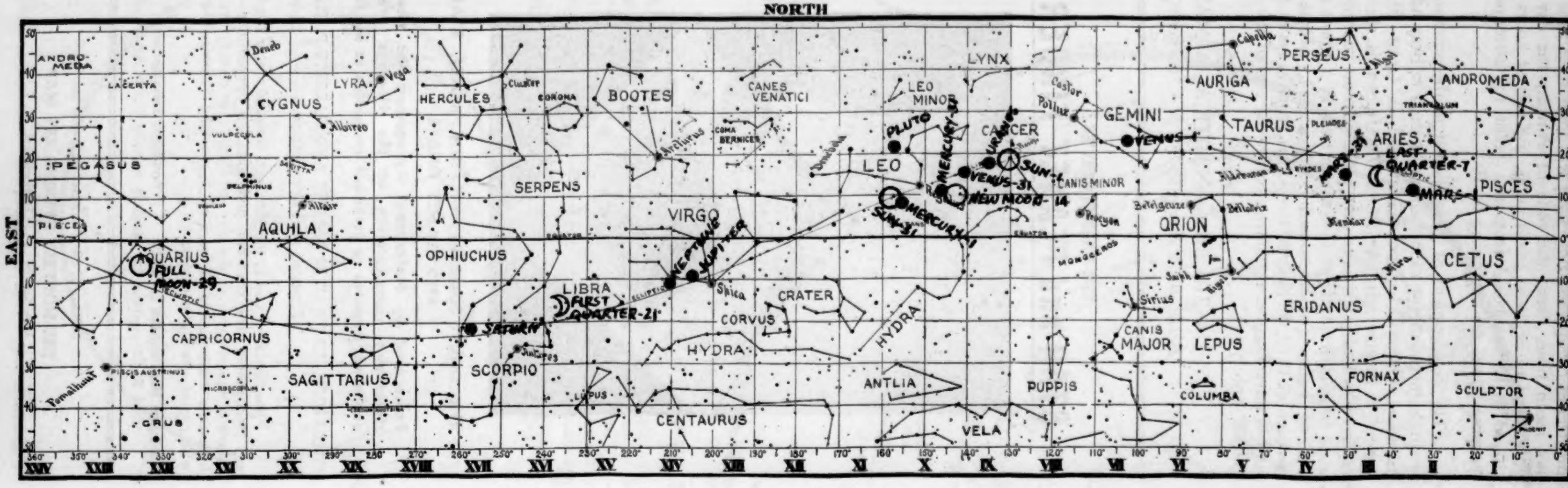


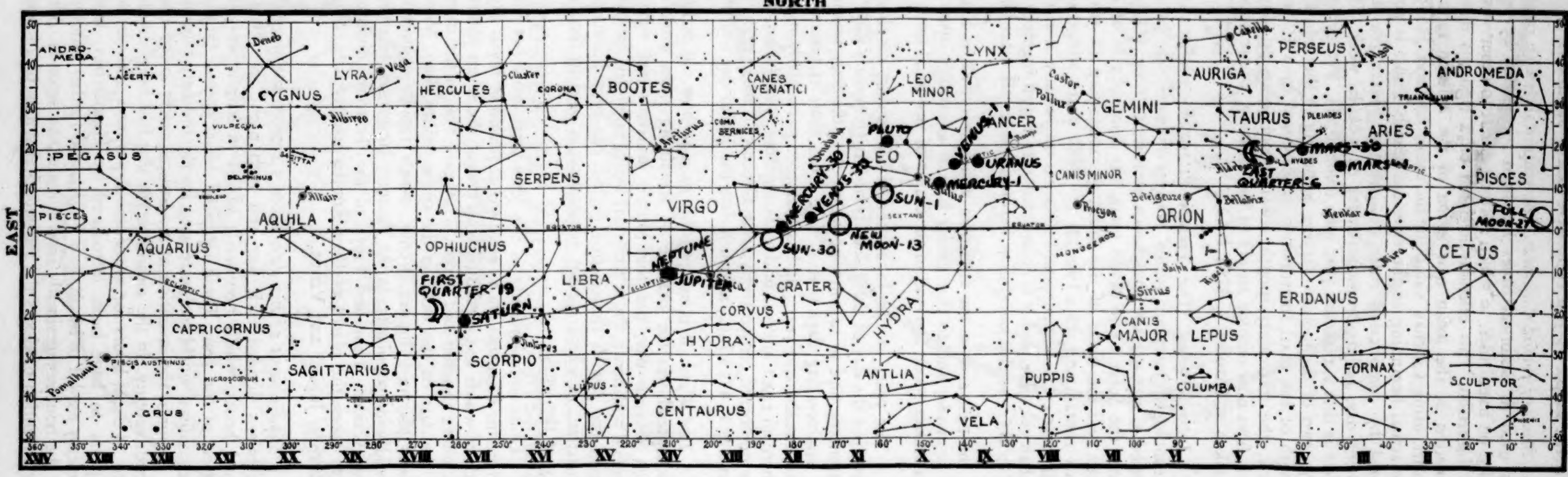


Nov. 5 Oct. 22 Oct. 5 Sept. 20 Sept. 5 Aug. 20 Aug. 5 July 20 July 5 June 20 June 5 May 20 May 5 Apr. 20 Apr. 5 Mar. 20 Mar. 5 Feb. 18 Feb. 2 Jan. 20 Jan. 5 Dec. 20 Dec. 5 Nov. 20

THE DATE BELOW EACH NUMERAL WILL SHOW WHEN THAT SECTION OF THE MAP WILL BE ON THE MERIDAN—DUE SOUTH—AT 9 P.M. OR AN HOUR EARLIER FOR EACH NUMERAL WEST OF THIS DATE AND AN HOUR LATER FOR EACH NUMERAL EAST.